SEQUENCE LISTING

```
<110> Simard, John J. L.
Diamond, David C.
Qiu, Zhiyong
Lei, Xiang-Dong
<120> EXPRESSION VECTORS
```

<120> EXPRESSION VECTORS ENCODING EPITOPES OF
 TARGET-ASSOCIATED ANTIGENS AND METHODS FOR THEIR DESIGN

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<130> MANNK.022C1
<150> 10/292,413
<151> 2002-11-07
<150> 60/336,968
<151> 2001-11-07
<160> 979
<170> FastSEQ for Windows Version 4.0
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Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
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Met Pro Arq Glu Asp Ala His Phe Ile Tyr Gly Tyr Pro Lys Lys Gly
His Gly His Ser Tyr Thr Thr Ala Glu Glu Ala Ala Gly Ile Gly Ile
Leu Thr Val Ile Leu Gly Val Leu Leu Ile Gly Cys Trp Tyr Cys
                            40
Arg Arg Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val
                        55
Gly Thr Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp
                    70
                                        75
His Arg Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
                85
                                    90
Val Pro Asn Ala Pro Pro Ala Tyr Glu Lys Leu Ser Ala Glu Gln Ser
           100
                                105
Pro Pro Pro Tyr Ser Pro
        115
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<211> 529 <212> PRT <213> Homo Sapien <400> 3 Met Leu Leu Ala Val Leu Tyr Cys Leu Leu Trp Ser Phe Gln Thr Ser 10 Ala Gly His Phe Pro Arg Ala Cys Val Ser Ser Lys Asn Leu Met Glu Lys Glu Cys Cys Pro Pro Trp Ser Gly Asp Arg Ser Pro Cys Gly Gln 40 Leu Ser Gly Arg Gly Ser Cys Gln Asn Ile Leu Leu Ser Asn Ala Pro 55 Leu Gly Pro Gln Phe Pro Phe Thr Gly Val Asp Asp Arg Glu Ser Trp Pro Ser Val Phe Tyr Asn Arg Thr Cys Gln Cys Ser Gly Asn Phe Met Gly Phe Asn Cys Gly Asn Cys Lys Phe Gly Phe Trp Gly Pro Asn Cys 105 Thr Glu Arg Arg Leu Leu Val Arg Arg Asn Ile Phe Asp Leu Ser Ala 120 Pro Glu Lys Asp Lys Phe Phe Ala Tyr Leu Thr Leu Ala Lys His Thr 135 140 Ile Ser Ser Asp Tyr Val Ile Pro Ile Gly Thr Tyr Gly Gln Met Lys 155 150 Asn Gly Ser Thr Pro Met Phe Asn Asp Ile Asn Ile Tyr Asp Leu Phe 165 170 Val Trp Met His Tyr Tyr Val Ser Met Asp Ala Leu Leu Gly Gly Ser 185 Glu Ile Trp Arg Asp Ile Asp Phe Ala His Glu Ala Pro Ala Phe Leu 200 205 Pro Trp His Arg Leu Phe Leu Leu Arg Trp Glu Gln Glu Ile Gln Lys 215 220 Leu Thr Gly Asp Glu Asn Phe Thr Ile Pro Tyr Trp Asp Trp Arg Asp 230 235 Ala Glu Lys Cys Asp Ile Cys Thr Asp Glu Tyr Met Gly Gly Gln His 250 245 Pro Thr Asn Pro Asn Leu Leu Ser Pro Ala Ser Phe Phe Ser Ser Trp 260 265 Gln Ile Val Cys Ser Arg Leu Glu Glu Tyr Asn Ser His Gln Ser Leu 280 Cys Asn Gly Thr Pro Glu Gly Pro Leu Arg Arg Asn Pro Gly Asn His 295 300 Asp Lys Ser Arg Thr Pro Arg Leu Pro Ser Ser Ala Asp Val Glu Phe 310 315 Cys Leu Ser Leu Thr Gln Tyr Glu Ser Gly Ser Met Asp Lys Ala Ala 330 Asn Phe Ser Phe Arg Asn Thr Leu Glu Gly Phe Ala Ser Pro Leu Thr 340 345 Gly Ile Ala Asp Ala Ser Gln Ser Ser Met His Asn Ala Leu His Ile 360 Tyr Met Asn Gly Thr Met Ser Gln Val Gln Gly Ser Ala Asn Asp Pro 375 380 Ile Phe Leu Leu His His Ala Phe Val Asp Ser Ile Phe Glu Gln Trp 390 395

```
Leu Arg Arg His Arg Pro Leu Gln Glu Val Tyr Pro Glu Ala Asn Ala
                                    410
Pro Ile Gly His Asn Arg Glu Ser Tyr Met Val Pro Phe Ile Pro Leu
                                425
Tyr Arg Asn Gly Asp Phe Phe Ile Ser Ser Lys Asp Leu Gly Tyr Asp
                            440
Tyr Ser Tyr Leu Gln Asp Ser Asp Pro Asp Ser Phe Gln Asp Tyr Ile
                        455
Lys Ser Tyr Leu Glu Gln Ala Ser Arg Ile Trp Ser Trp Leu Leu Gly
                    470
                                        475
Ala Ala Met Val Gly Ala Val Leu Thr Ala Leu Leu Ala Gly Leu Val
                485
                                    490
Ser Leu Leu Cys Arg His Lys Arg Lys Gln Leu Pro Glu Glu Lys Gln
                                505
Pro Leu Leu Met Glu Lys Glu Asp Tyr His Ser Leu Tyr Gln Ser His
                            520
                                                 525
Leu
<210> 4
<211> 94
<212> PRT
<213> Artificial Sequence
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<223> pMA2M expression product
Met Leu Leu Ala Val Leu Tyr Cys Leu Glu Leu Ala Gly Ile Gly Ile
Leu Thr Val Tyr Met Asp Gly Thr Met Ser Gln Val Gly Ile Leu Thr
                                25
Val Ile Leu Gly Val Leu Leu Ile Gly Cys Trp Tyr Cys Arg Arg
                            40
Arg Asn Gly Tyr Arg Ala Leu Met Asp Lys Ser Leu His Val Gly Thr
Gln Cys Ala Leu Thr Arg Arg Cys Pro Gln Glu Gly Phe Asp His Arg
                    70
                                        75
Asp Ser Lys Val Ser Leu Gln Glu Lys Asn Cys Glu Pro Val
<210> 5
<211> 28
<212> PRT
<213> Artificial Sequence
<220>
<223> Epitope liberation sequence for SEQ ID NO. 1 from
      pMA2M
<400> 5
Met Leu Leu Ala Val Leu Tyr Cys Leu Glu Leu Ala Gly Ile Gly Ile
                                    10
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25

Leu Thr Val Tyr Met Asp Gly Thr Met Ser Gln Val

20

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<210> 6
<211> 9
<212> PRT
<213> Homo Sapien
<400> 6
Met Leu Leu Ala Val Leu Tyr Cys Leu
                 5
<210> 7
<211> 9
<212> PRT
<213> Homo Sapien
<400> 7
Tyr Met Asp Gly Thr Met Ser Gln Val
<210> 8
<211> 10
<212> PRT
<213> Homo Sapien
<400> 8
Glu Ala Ala Gly Ile Gly Ile Leu Thr Val
                 5
<210> 9
<211> 307
<212> DNA
<213> Artificial Sequence
<220>
<223> pMA2M insert coding region
<400> 9
cttaagccac catgttacta gctgttttgt actgcctgga actagcaggg atcggcatat 60
tgacagtgta tatggatgga acaatgtccc aggtaggaat tctgacagtg atcctgggag 120
tettaetget eateggetgt tggtattgta gaagaegaaa tggataeaga geettgatgg 180
ataaaagtct tcatgttggc actcaatgtg ccttaacaag aagatgccca caagaagggt 240
ttgatcatcg ggacagcaaa gtgtctcttc aagagaaaaa ctgtgaacct gtgtagtgag 300
                                                                    307
cggccgc
<210> 10
<211> 85
<212> PRT
<213> Artificial Sequence
<220>
<223> Epitope array from pVAXM2 and pVAXM1
<400> 10
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Met Val Leu Tyr Cys Leu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val
Tyr Met Asp Gly Thr Ala Val Leu Tyr Cys Leu Glu Leu Ala Gly Ile
Gly Ile Leu Thr Val Tyr Met Asp Gly Thr Met Leu Ala Val Leu Tyr
                            40
Cys Leu Glu Leu Ala Gly Ile Gly Ile Leu Thr Val Tyr Met Asp Gly
Thr Met Ser Leu Leu Ala Val Leu Tyr Cys Leu Glu Leu Ala Gly Ile
                                        75
Gly Ile Leu Thr Val
<210> 11
<211> 180
<212> PRT
<213> Homo Sapien
<400> 11
Met Gln Ala Glu Gly Arg Gly Thr Gly Gly Ser Thr Gly Asp Ala Asp
Gly Pro Gly Gly Pro Gly Ile Pro Asp Gly Pro Gly Gly Asn Ala Gly
            20
                                25
Gly Pro Gly Glu Ala Gly Ala Thr Gly Gly Arg Gly Pro Arg Gly Ala
                            40
Gly Ala Ala Arg Ala Ser Gly Pro Gly Gly Gly Ala Pro Arg Gly Pro
                        55
His Gly Gly Ala Ala Ser Gly Leu Asn Gly Cys Cys Arg Cys Gly Ala
Arg Gly Pro Glu Ser Arg Leu Leu Glu Phe Tyr Leu Ala Met Pro Phe
Ala Thr Pro Met Glu Ala Glu Leu Ala Arg Arg Ser Leu Ala Gln Asp
Ala Pro Pro Leu Pro Val Pro Gly Val Leu Leu Lys Glu Phe Thr Val
                            120
Ser Gly Asn Ile Leu Thr Ile Arg Leu Thr Ala Ala Asp His Arg Gln
                        135
                                            140
Leu Gln Leu Ser Ile Ser Ser Cys Leu Gln Gln Leu Ser Leu Leu Met
                                        155
Trp Ile Thr Gln Cys Phe Leu Pro Val Phe Leu Ala Gln Pro Pro Ser
                165
                                    170
Gly Gln Arg Arg
            180
<210> 12
<211> 9
<212> PRT
<213> Homo Sapien
<400> 12
Ser Leu Leu Met Trp Ile Thr Gln Cys
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<211> 9
<212> PRT
<213> Homo Sapien
<400> 13
Lys Ala Ser Glu Lys Ile Phe Tyr Val
<210> 14
<211> 9
<212> PRT
<213> Homo Sapien
<400> 14
Thr Gln Cys Phe Leu Pro Val Phe Leu
                5
<210> 15
<211> 10
<212> PRT
<213> Homo Sapien
<400> 15
Gly Leu Pro Ser Ile Pro Val His Pro Ile
<210> 16
<211> 6
<212> PRT
<213> Homo Sapien
<400> 16
Ala Val Leu Tyr Cys Leu
<210> 17
<211> 123
<212> PRT
<213> Artificial Sequence
<220>
<223> pN157 expression product
<400> 17
Met Ser Leu Leu Met Trp Ile Thr Gln Cys Lys Ala Ser Glu Lys Ile
                                    10
Phe Tyr Val Arg Cys Gly Ala Arg Gly Pro Glu Ser Arg Leu Leu Glu
            20
                                 25
Phe Tyr Leu Ala Met Pro Phe Ala Thr Pro Met Glu Ala Glu Leu Ala
                            40
Arg Arg Ser Leu Ala Gln Asp Ala Pro Pro Leu Pro Val Pro Gly Val
                        55
Leu Leu Lys Glu Phe Thr Val Ser Gly Asn Ile Leu Thr Ile Arg Leu
```

```
65
                    70
                                        75
Thr Ala Ala Asp His Arg Gln Leu Gln Leu Ser Ile Ser Ser Cys Leu
                                    90
Gln Gln Leu Ser Leu Leu Met Trp Ile Thr Gln Cys Phe Leu Pro Val
                                105
Phe Leu Ala Gln Pro Pro Ser Gly Gln Arg Arg
                            120
<210> 18
<211> 19
<212> PRT
<213> Artificial Sequence
<220>
<223> Epitope liberation sequence for SEQ ID NO. 12 from
      pN157
<400> 18
Met Ser Leu Leu Met Trp Ile Thr Gln Cys Lys Ala Ser Glu Lys Ile
                                    10
Phe Tyr Val
<210> 19
<211> 392
<212> DNA
<213> Artificial Sequence
<220>
<223> pN157 insert coding region
<400> 19
cttaaqccac catqtccctq ttgatgtgga tcacgcagtg caaagcttcg gagaaaatct 60
tctacgtacg gtgcggtgcc agggggccgg agagccgcct gcttgagttc tacctcgcca 120
tgcctttcgc gacacccatg gaagcagagc tggcccgcag gagcctggcc caggatgccc 180
caccgcttcc cgtgccaggg gtgcttctga aggagttcac tgtgtccggc aacatactga 240
ctatccgact gactgctgca gaccaccgcc aactgcagct ctccatcagc tcctgtctcc 300
agcagettte cetgttgatg tggateaege agtgetttet gecegtgttt ttggeteage 360
                                                                    392
ctccctcagg gcagaggcgc tagtgagaat tc
<210> 20
<211> 179
<212> PRT
<213> Artificial Sequence
<220>
<223> pBPL expression product
<400> 20
Met Ser Leu Leu Met Trp Ile Thr Gln Cys Lys Ala Ser Glu Lys Ile
                                     10
Phe Tyr Val Gly Leu Pro Ser Ile Pro Val His Pro Ile Gly Leu Pro
                                 25
Ser Ile Pro Val His Pro Ile Lys Ala Ser Glu Lys Ile Phe Tyr Val
        35
                             40
                                                 45
```

```
Ser Leu Leu Met Trp Ile Thr Gln Cys Lys Ala Ser Glu Lys Ile Phe
                        55
Tyr Val Lys Ala Ser Glu Lys Ile Phe Tyr Val Arg Cys Gly Ala Arg
                    70
                                        75
Gly Pro Glu Ser Arg Leu Leu Glu Phe Tyr Leu Ala Met Pro Phe Ala
                                    90
                85
Thr Pro Met Glu Ala Glu Leu Ala Arg Arg Ser Leu Ala Gln Asp Ala
                                105
Pro Pro Leu Pro Val Pro Gly Val Leu Leu Lys Glu Phe Thr Val Ser
                            120
                                                 125
Gly Asn Ile Leu Thr Ile Arg Leu Thr Ala Ala Asp His Arg Gln Leu
                        135
                                            140
Gln Leu Ser Ile Ser Ser Cys Leu Gln Gln Leu Ser Leu Leu Met Trp
                                        155
Ile Thr Gln Cys Phe Leu Pro Val Phe Leu Ala Gln Pro Pro Ser Gly
                165
                                    170
Gln Arg Arg
<210> 21
<211> 543
<212> DNA
<213> Artificial Sequence
<220>
<223> pBPL insert coding region
<400> 21
atqtccctqt tqatqtqqat cacqcaqtqc aaaqcttcqq aqaaaatctt ctatgtgggt 60
cttccaagta ttcctgttca tccaattggt cttccaagta ttcctgttca tccaattaaa 120
gcttcggaga aaatcttcta tgtgtccctg ttgatgtgga tcacgcagtg caaagcttcg 180
gagaaaatct tctatgtgaa agcttcggag aaaatcttct acgtacggtg cggtgccagg 240
qqqccqqaqa qccqcctqct tqaqttctac ctcqccatgc ctttcqcgac acccatggaa 300
qcaqaqctqq cccqcaqqaq cctqqcccaq qatqccccac cgcttcccgt gccaggggtg 360
cttctqaaqq aqttcactqt qtccqqcaac atactqacta tccqactqac tgctqcagac 420
caccqccaac tqcaqctctc catcaqctcc tqtctccaqc aqctttccct qttqatqtqg 480
atcacqcaqt qctttctqcc cqtqtttttq qctcaqcctc cctcaqgqca qagqcqctaq 540
                                                                   543
tga
<210> 22
<211> 29
<212> PRT
<213> Artificial Sequence
<220>
<223> liberation sequence for SEQ ID NO. 22
<400> 22
Ile Lys Ala Ser Glu Lys Ile Phe Tyr Val Ser Leu Leu Met Trp Ile
                                    10
Thr Gln Cys Lys Ala Ser Glu Lys Ile Phe Tyr Val Lys
                                25
            20
<210> 23
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<211> 9

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<212> PRT
<213> Homo Sapien
<400> 23
Val Met Thr Lys Leu Gly Phe Lys Val
<210> 24
<211> 10
<212> PRT
<213> Homo Sapien
<400> 24
Arg Gln Ile Tyr Val Ala Ala Phe Thr Val
<210> 25
<211> 169
<212> PRT
<213> Homo Sapien
<400> 25
Ala Gln Ile Pro Glu Lys Ile Gln Lys Ala Phe Asp Asp Ile Ala Lys
                                    10
Tyr Phe Ser Lys Glu Glu Trp Glu Lys Met Lys Ala Ser Glu Lys Ile
                                25
Phe Tyr Val Tyr Met Lys Arg Lys Tyr Glu Ala Met Thr Lys Leu Gly
Phe Lys Ala Thr Leu Pro Pro Phe Met Cys Asn Lys Arg Ala Glu Asp
                        55
Phe Gln Gly Asn Asp Leu Asp Asn Asp Pro Asn Arg Gly Asn Gln Val
                   70
Glu Arg Pro Gln Met Thr Phe Gly Arg Leu Gln Gly Ile Ser Pro Lys
                                    90
               85
Ile Met Pro Lys Lys Pro Ala Glu Glu Gly Asn Asp Ser Glu Glu Val
                                105
Pro Glu Ala Ser Gly Pro Gln Asn Asp Gly Lys Glu Leu Cys Pro Pro
                            120
Gly Lys Pro Thr Thr Ser Glu Lys Ile His Glu Arg Ser Gly Pro Lys
                        135
                                            140
Arg Gly Glu His Ala Trp Thr His Arg Leu Arg Glu Arg Lys Gln Leu
                    150
                                        155
Val Ile Tyr Glu Glu Ile Ser Asp Pro
                165
<210> 26
<211> 245
<212> PRT
<213> Artificial Sequence
<223> CTLS1/pCBP expression product
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<400> 26

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Met Val Met Thr Lys Leu Gly Phe Lys Val Lys Ala Ser Glu Lys Ile
Phe Tyr Val Arg Gln Ile Tyr Val Ala Ala Phe Thr Val Gly Leu Pro
Ser Ile Pro Val His Pro Ile Thr Gln Cys Phe Leu Pro Val Phe Leu
Val Met Thr Lys Leu Gly Phe Lys Val Arg Gln Ile Tyr Val Ala Ala
Phe Thr Val Lys Ala Ser Glu Lys Ile Phe Tyr Val Ala Gln Ile Pro
Glu Lys Ile Gln Lys Ala Phe Asp Asp Ile Ala Lys Tyr Phe Ser Lys
                                    90
Glu Glu Trp Glu Lys Met Lys Ala Ser Glu Lys Ile Phe Tyr Val Tyr
                               105
Met Lys Arg Lys Tyr Glu Ala Met Thr Lys Leu Gly Phe Lys Ala Thr
                            120
Leu Pro Pro Phe Met Cys Asn Lys Arg Ala Glu Asp Phe Gln Gly Asn
                        135
                                            140
Asp Leu Asp Asn Asp Pro Asn Arg Gly Asn Gln Val Glu Arg Pro Gln
                   150
                                       155
Met Thr Phe Gly Arg Leu Gln Gly Ile Ser Pro Lys Ile Met Pro Lys
                                    170
               165
Lys Pro Ala Glu Glu Gly Asn Asp Ser Glu Glu Val Pro Glu Ala Ser
                               185
Gly Pro Gln Asn Asp Gly Lys Glu Leu Cys Pro Pro Gly Lys Pro Thr
                           200
Thr Ser Glu Lys Ile His Glu Arg Ser Gly Pro Lys Arg Gly Glu His
                        215
Ala Trp Thr His Arg Leu Arg Glu Arg Lys Gln Leu Val Ile Tyr Glu
                    230
                                        235
Glu Ile Ser Asp Pro
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<211> 245

<212> PRT

<213> Artificial Sequence

<220>

<223> CTL52 expression product

<400> 27

 Met Ala Gln Ile Pro Glu Lys Ile Gln Lys Ala Phe Asp Asp Ile Ala 1
 5
 10
 15

 Lys Tyr Phe Ser Lys Glu Glu Trp Glu Lys Met Lys Ala Ser Glu Lys 20
 25
 30

 Ile Phe Tyr Val Tyr Met Lys Arg Lys Tyr Glu Ala Met Thr Lys Leu 35
 40
 45

 Gly Phe Lys Ala Thr Leu Pro Pro Pro Phe Met Cys Asn Lys Arg Ala Glu 50
 55
 60

 Asp Phe Gln Gly Asn Asp Leu Asp Asn Asp Pro Asn Arg Gly Asn Gln 65
 70
 75
 80

 Val Glu Arg Pro Gln Met Thr Phe Gly Arg Leu Gln Gly Ile Ser Pro 85
 90
 95

 Lys Ile Met Pro Lys Lys Pro Ala Glu Glu Gly Asn Asp Ser Glu Glu Glu Gly 110

```
Val Pro Glu Ala Ser Gly Pro Gln Asn Asp Gly Lys Glu Leu Cys Pro
                            120
Pro Gly Lys Pro Thr Thr Ser Glu Lys Ile His Glu Arg Ser Gly Pro
                        135
Lys Arg Gly Glu His Ala Trp Thr His Arg Leu Arg Glu Arg Lys Gln
                    150
                                        155
Leu Val Ile Tyr Glu Glu Ile Ser Asp Pro Val Met Thr Lys Leu Gly
                165
                                    170
Phe Lys Val Lys Ala Ser Glu Lys Ile Phe Tyr Val Arg Gln Ile Tyr
                                185
Val Ala Ala Phe Thr Val Gly Leu Pro Ser Ile Pro Val His Pro Ile
                            200
                                                205
Thr Gln Cys Phe Leu Pro Val Phe Leu Val Met Thr Lys Leu Gly Phe
                        215
                                            220
Lys Val Arg Gln Ile Tyr Val Ala Ala Phe Thr Val Lys Ala Ser Glu
                                        235
                    230
Lys Ile Phe Tyr Val
                245
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<211> 208

<212> PRT

<213> Artificial Sequence

<220>

<223> CTL53 expression product

<400> 28

Met Val Met Thr Lys Leu Gly Phe Lys Val Lys Ala Ser Glu Lys Ile Phe Tyr Val Arg Gln Ile Tyr Val Ala Ala Phe Thr Val Gly Leu Pro 25 Ser Ile Pro Val His Pro Ile Ala Gln Ile Pro Glu Lys Ile Gln Lys 40 Ala Phe Asp Asp Ile Ala Lys Tyr Phe Ser Lys Glu Glu Trp Glu Lys 55 Met Lys Ala Ser Glu Lys Ile Phe Tyr Val Tyr Met Lys Arg Lys Tyr 75 70 Glu Ala Met Thr Lys Leu Gly Phe Lys Ala Thr Leu Pro Pro Phe Met 85 Cys Asn Lys Arg Ala Glu Asp Phe Gln Gly Asn Asp Leu Asp Asn Asp 100 105 Pro Asn Arg Gly Asn Gln Val Glu Arg Pro Gln Met Thr Phe Gly Arg 120 115 Leu Gln Gly Ile Ser Pro Lys Ile Met Pro Lys Lys Pro Ala Glu Glu 135 140 Gly Asn Asp Ser Glu Glu Val Pro Glu Ala Ser Gly Pro Gln Asn Asp 150 155 Gly Lys Glu Leu Cys Pro Pro Gly Lys Pro Thr Thr Ser Glu Lys Ile 170 His Glu Arg Ser Gly Pro Lys Arg Gly Glu His Ala Trp Thr His Arg 185 190 Leu Arg Glu Arg Lys Gln Leu Val Ile Tyr Glu Glu Ile Ser Asp Pro 200 205

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<210> 29
<211> 207
<212> PRT
<213> Artificial Sequence
<220>
<223> CTL54 expression product
<400> 29
Met Ala Gln Ile Pro Glu Lys Ile Gln Lys Ala Phe Asp Asp Ile Ala
Lys Tyr Phe Ser Lys Glu Glu Trp Glu Lys Met Lys Ala Ser Glu Lys
                                25
Ile Phe Tyr Val Tyr Met Lys Arg Lys Tyr Glu Ala Met Thr Lys Leu
                            40
Gly Phe Lys Ala Thr Leu Pro Pro Phe Met Cys Asn Lys Arg Ala Glu
Asp Phe Gln Gly Asn Asp Leu Asp Asn Asp Pro Asn Arg Gly Asn Gln
                    70
                                        75
Val Glu Arg Pro Gln Met Thr Phe Gly Arg Leu Gln Gly Ile Ser Pro
                                    90
Lys Ile Met Pro Lys Lys Pro Ala Glu Glu Gly Asn Asp Ser Glu Glu
                                105
Val Pro Glu Ala Ser Gly Pro Gln Asn Asp Gly Lys Glu Leu Cys Pro
                            120
                                                125
Pro Gly Lys Pro Thr Thr Ser Glu Lys Ile His Glu Arg Ser Gly Pro
                        135
                                            140
Lys Arg Gly Glu His Ala Trp Thr His Arg Leu Arg Glu Arg Lys Gln
                                        155
                    150
Leu Val Ile Tyr Glu Glu Ile Ser Asp Pro Thr Gln Cys Phe Leu Pro
                                    170
Val Phe Leu Val Met Thr Lys Leu Gly Phe Lys Val Arg Gln Ile Tyr
                                185
Val Ala Ala Phe Thr Val Lys Ala Ser Glu Lys Ile Phe Tyr Val
       195
                            200
<210> 30
<211> 741
<212> DNA
<213> Artificial Sequence
<220>
<223> pCBP insert coding region
<400> 30
atggtcatga ctaaactagg tttcaaggtc aaagcttcgg agaaaatctt ctatgtgaga 60
cagatttatg ttgcagcctt cacagtgggt cttccaagta ttcctgttca tccaattacg 120
cagtgctttc tgcccgtgtt tttggtcatg actaaactag gtttcaaggt cagacagatt 180
tatqttqcaq ccttcacagt gaaagcttcg gagaaaatct tctacgtagc tcaaatacca 240
gagaagatcc aaaaggcctt cgatgatatt gccaaatact tctctaagga agagtgggaa 300
aagatgaaag cctcggagaa aatcttctat gtgtatatga agagaaagta tgaggctatg 360
actaaactaq qtttcaagqc caccetecca cetttcatgt gtaataaacg ggeegaagac 420
ttccagggga atgatttgga taatgaccct aaccgtggga atcaggttga acgtcctcag 480
atgactttcg gcaggctcca gggaatctcc ccgaagatca tgcccaagaa gccagcagag 540
gaaqqaaatq attcqqaqqa aqtqccaqaa gcatctgqcc cacaaaatga tgggaaagag 600
ctqtqccccc cqqqaaaacc aactacctct qaqaagattc acgagagatc tggacccaaa 660
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aggggggaac atgcctggac ccacagactg cgtgagagaa aacagctggt gatttatgaa 720
gagatcagcg accettagtg a
                                                                    741
<210> 31
<211> 28
<212> PRT
<213> Artificial Sequence
<223> CTLS11-2 liberation/substrate sequence
<400> 31
Arg Gln Ile Tyr Val Ala Ala Phe Thr Val Lys Ala Ser Glu Lys Ile
Phe Tyr Val Ala Gln Ile Pro Glu Lys Ile Gln Lys
            20
                                 25
<210> 32
<211> 9
<212> PRT
<213> Homo Sapien
Phe Leu Pro Trp His Arg Leu Phe Leu
                 5
<210> 33
<211> 104
<212> PRT
<213> Artificial Sequence
<220>
<223> CTLT2/pMEL expression product
<400> 33
Met Leu Leu Ala Val Leu Tyr Cys Leu Leu Trp Ser Phe Gln Thr Ser
                                     10
Ala Phe Leu Pro Trp His Arg Leu Phe Leu Met Leu Leu Ala Val Leu
                                25
Tyr Cys Leu Leu Trp Ser Phe Gln Thr Ser Ala Phe Leu Pro Trp His
Arg Leu Phe Leu Met Leu Leu Ala Val Leu Tyr Cys Leu Leu Trp Ser
                        55
                                             60
Phe Gln Thr Ser Ala Phe Leu Pro Trp His Arg Leu Phe Leu Met Leu
                    70
                                         75
Leu Ala Val Leu Tyr Cys Leu Leu Trp Ser Phe Gln Thr Ser Ala Phe
Leu Pro Trp His Arg Leu Phe Leu
            100
<210> 34
<211> 318
<212> DNA
<213> Artificial Sequence
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<220>
<223> CTLT2/pMEL insert coding region
atgctcctgg ctgttttgta ctgcctgctg tggagtttcc agacctccgc ttttctqcct 60
tggcatagac tettettgat geteetgget gttttgtact geetgetgtg gagttteeag 120
acctccqctt ttctqccttq qcataqactc ttcttqatqc tcctqqctqt tttqtactqc 180
ctgctqtqqa qtttccaqac ctccqctttt ctqccttqqc ataqactctt cttqatqctc 240
ctggctgttt tgtactgcct gctgtggagt ttccagacct ccgcttttct gccttggcat 300
agactcttct tgtagtga
                                                                  318
<210> 35
<211> 1524
<212> DNA
<213> Homo Sapien
<400> 35
agcagacaga ggacteteat taaggaaggt gteetgtgee etgaceetae aagatgeeaa 60 '
gagaagatgc tcacttcatc tatggttacc ccaagaaggg gcacggccac tcttacacca 120
cggctgaaga ggccgctggg atcggcatcc tgacagtgat cctgggagtc ttactgctca 180
tcggctgttg gtattgtaga agacgaaatg gatacagagc cttgatggat aaaagtcttc 240
atgttggcac tcaatgtgcc ttaacaagaa gatgcccaca agaagggttt gatcatcggg 300
acagcaaagt gtctcttcaa gagaaaaact gtgaacctgt ggttcccaat gctccacctg 360
cttatgagaa actctctgca gaacagtcac caccacctta ttcaccttaa gagccagcga 420
gacacctgag acatgctgaa attatttctc tcacactttt gcttgaattt aatacagaca 480
tctaatgttc tcctttggaa tggtgtagga aaaatgcaag ccatctctaa taataagtca 540
gtgttaaaat tttagtaggt ccgctagcag tactaatcat gtgaggaaat gatgagaaat 600
attaaattgg gaaaactcca tcaataaatg ttgcaatgca tgatactatc tgtgccagag 660
qtaatgttag taaatccatg qtqttatttt ctqaqaqaca qaattcaagt gggtattctg 720
gggccatcca atttctcttt acttgaaatt tggctaataa caaactagtc aggttttcga 780
accttgaccg acatgaactg tacacagaat tgttccagta ctatggagtg ctcacaaagg 840
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Phe Leu Leu Gly Phe Leu Phe Gly Trp Phe Ile Lys Ser Ser Asn Glu
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Leu Lys Ala Glu Asn Ile Lys Lys Phe Leu Tyr Asn Phe Thr Gln Ile
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Pro His Leu Ala Gly Thr Glu Gln Asn Phe Gln Leu Ala Lys Gln Ile
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Gln Ser Gln Trp Lys Glu Phe Gly Leu Asp Ser Val Glu Leu Ala His
                                105
Tyr Asp Val Leu Leu Ser Tyr Pro Asn Lys Thr His Pro Asn Tyr Ile
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Ser Ile Ile Asn Glu Asp Gly Asn Glu Ile Phe Asn Thr Ser Leu Phe
                        135
                                            140
Glu Pro Pro Pro Pro Gly Tyr Glu Asn Val Ser Asp Ile Val Pro Pro
                    150
                                        155
Phe Ser Ala Phe Ser Pro Gln Gly Met Pro Glu Gly Asp Leu Val Tyr
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                                    170
Val Asn Tyr Ala Arg Thr Glu Asp Phe Phe Lys Leu Glu Arg Asp Met
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Lys Ile Asn Cys Ser Gly Lys Ile Val Ile Ala Arg Tyr Gly Lys Val
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Phe Arg Gly Asn Lys Val Lys Asn Ala Gln Leu Ala Gly Ala Lys Gly
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Val Ile Leu Tyr Ser Asp Pro Ala Asp Tyr Phe Ala Pro Gly Val Lys
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Ser Tyr Pro Asp Gly Trp Asn Leu Pro Gly Gly Gly Val Gln Arg Gly
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Pro Ala Asn Glu Tyr Ala Tyr Arg Arg Gly Ile Ala Glu Ala Val Gly
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Leu Leu Glu Lys Met Gly Gly Ser Ala Pro Pro Asp Ser Ser Trp Arg
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                                        315
Gly Ser Leu Lys Val Pro Tyr Asn Val Gly Pro Gly Phe Thr Gly Asn
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Phe Ser Thr Gln Lys Val Lys Met His Ile His Ser Thr Asn Glu Val
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Thr Arg Ile Tyr Asn Val Ile Gly Thr Leu Arg Gly Ala Val Glu Pro
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Asp Arg Tyr Val Ile Leu Gly Gly His Arg Asp Ser Trp Val Phe Gly
                        375
                                            380
Gly Ile Asp Pro Gln Ser Gly Ala Ala Val Val His Glu Ile Val Arg
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                                        395
Ser Phe Gly Thr Leu Lys Lys Glu Gly Trp Arg Pro Arg Arg Thr Ile
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Leu Phe Ala Ser Trp Asp Ala Glu Glu Phe Gly Leu Leu Gly Ser Thr
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Glu Trp Ala Glu Glu Asn Ser Arg Leu Leu Gln Glu Arg Gly Val Ala
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Tyr Ile Asn Ala Asp Ser Ser Ile Glu Gly Asn Tyr Thr Leu Arg Val
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Asp Cys Thr Pro Leu Met Tyr Ser Leu Val His Asn Leu Thr Lys Glu
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Trp Thr Lys Lys Ser Pro Ser Pro Glu Phe Ser Gly Met Pro Arg Ile
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Ser Lys Leu Gly Ser Gly Asn Asp Phe Glu Val Phe Phe Gln Arg Leu
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Gly Ile Ala Ser Gly Arg Ala Arg Tyr Thr Lys Asn Trp Glu Thr Asn
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Lys Phe Ser Gly Tyr Pro Leu Tyr His Ser Val Tyr Glu Thr Tyr Glu
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Ala Gln Val Arg Gly Gly Met Val Phe Glu Leu Ala Asn Ser Ile Val
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Leu Pro Phe Asp Cys Arg Asp Tyr Ala Val Val Leu Arg Lys Tyr Ala
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Asp Lys Ile Tyr Ser Ile Ser Met Lys His Pro Gln Glu Met Lys Thr
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Tyr Ser Val Ser Phe Asp Ser Leu Phe Ser Ala Val Lys Asn Phe Thr
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Glu Ile Ala Ser Lys Phe Ser Glu Arg Leu Gln Asp Phe Asp Lys Ser
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Asn Pro Ile Val Leu Arg Met Met Asn Asp Gln Leu Met Phe Leu Glu
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Arg Ala Phe Ile Asp Pro Leu Gly Leu Pro Asp Arg Pro Phe Tyr Arg
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His Val Ile Tyr Ala Pro Ser Ser His Asn Lys Tyr Ala Gly Glu Ser
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Phe Pro Gly Ile Tyr Asp Ala Leu Phe Asp Ile Glu Ser Lys Val Asp
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<212> DNA
<213> Homo Sapien
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Val Tyr Met Lys Arg Lys Tyr Glu Ala Met Thr Lys Leu Gly Phe Lys
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Ala Thr Leu Pro Pro Phe Met Cys Asn Lys Arg Ala Glu Asp Phe Gln
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Gly Asn Asp Leu Asp Asn Asp Pro Asn Arg Gly Asn Gln Val Glu Arg
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Pro Gln Met Thr Phe Gly Arg Leu Gln Gly Ile Ser Pro Lys Ile Met
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Pro Lys Lys Pro Ala Glu Glu Gly Asn Asp Ser Glu Glu Val Pro Glu
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155

140

Ala Ser Gly Pro Gln Asn Asp Gly Lys Glu Leu Cys Pro Pro Gly Lys

Pro Thr Thr Ser Glu Lys Ile His Glu Arg Ser Gly Pro Lys Arg Gly

135

150

145

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Thr Arg Ser Arg Gln Arg Gly Glu Val Arg Phe Val Gln Tyr Asp Glu
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Ser Asp Tyr Ala Leu Tyr Gly Gly Ser Ser Ser Glu Asp Asp Glu His
Pro Glu Val Pro Arg Thr Arg Arg Pro Val Ser Gly Ala Val Leu Ser
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Gly Pro Gly Pro Ala Arg Ala Pro Pro Pro Phe Thr Pro Ala Gly Ser
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                               105
Gly Gly Ala Gly Arg Thr Pro Thr Thr Ala Pro Arg Ala Pro Arg Thr
                           120
Gln Arg Val Ala Thr Lys Ala Pro Ala Ala Pro Ala Ala Glu Thr Thr
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Arg Gly Arg Lys Ser Ala Gln Pro Glu Ser Ala Ala Leu Pro Asp Ala
                    150
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Pro Ala Ser Thr Ala Pro Thr Phe Thr Arg Ser Lys Thr Pro Ala Gln
               165
                                   170
Gly Leu Ala Arg Lys Leu His Phe Ser Thr Ala Pro Pro Asn Pro Asp
                               185
           180
Ala Pro Trp Thr Pro Arg Val Ala Gly Phe Asn Lys Arg Val Phe Cys
       195
                            200
Ala Ala Val Gly Arg Leu Ala Ala Met His Ala Arg Met Ala Ala Val
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                                           220
Gln Leu Trp Asp Phe Thr Met Ser Arg Pro Arg Thr Asp Glu Asp Leu
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                                        235
Asn Glu Leu Leu Gly Ile Thr Thr Ile Arg Val Thr Val Cys Glu Gly
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                                    250
Lys Asn Leu Leu Gln Arg Ala Asn Glu Leu Val Asn Pro Asp Val Val
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Gln Asp Val Asp Ala Ala Thr Ala Thr Arg Gly Arg Ser Ala Ala Ser
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Ser Gly Pro Ser Asn Ile Pro Pro Glu Ile
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Glu Asn Ala Leu Leu Val Ala Leu Phe
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Thr Ala Phe Thr Ile Pro Ser Ile
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Tyr Pro His Phe Met Pro Thr Asn Leu
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Cys Leu Ser Trp Asn Gly Pro His Leu
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Ala Asn Tyr Asp Phe Ile Cys Val
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Lys Ser Pro Trp Phe Thr Thr Leu
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Ser Ser Trp Asp Phe Ile Thr Val
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Cys Cys Leu Cys Leu Thr Val Phe Leu
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Ser Arg Arg Tyr Pro Asp Ala Val Tyr Leu His
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Tyr Pro Ala Leu Gly Leu His Glu Phe
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Phe Tyr Asp Gly Phe Ser Lys Val Pro Leu
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Val Glu Ala Glu Ile Ala His Gln Ile
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Leu Leu Tyr Arg Phe Leu Leu
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Val Gly Pro Val Phe Pro Pro Gly Met
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Tyr Ser Gly Tyr Ile Phe Arg Asp Leu
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Val Val Tyr Asp Phe Leu Lys Cys
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Ser Ala Ile Asn Asn Tyr Ala Gln Lys Leu
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Gln Gly Ile Asn Asn Leu Asp Asn Leu
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Asn Asn Leu Asp Asn Leu Arg Asp Tyr Leu
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Glu Ala Asp Pro Thr Gly His Ser Tyr
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Val Ser Asp Gly Gly Pro Asn Leu Tyr
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Cys Thr Glu Leu Lys Leu Ser Asp Tyr
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Glu Val Asp Pro Ile Gly His Leu Tyr
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Met Leu Leu Ser Val Pro Leu Leu Gly
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Tyr Met Asp Gly Thr Met Ser Gln Val
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Leu Leu Gly Phe Val Phe Thr Leu Thr Val
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Gly Leu Ser Pro Thr Val Trp Leu Ser Val
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Trp Leu Ser Leu Leu Val Pro Phe Val
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Lys Leu Val Ala Leu Gly Ile Asn Ala Val
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 Arg Leu Val Thr Leu Lys Asp Ile Val
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 Met Leu Leu Ala Val Leu Tyr Cys Leu
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 Ala Ala Gly Ile Gly Ile Leu Thr Val
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 Tyr Leu Glu Pro Gly Pro Val Thr Ala
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 Ile Leu Asp Gly Thr Ala Thr Leu Arg Leu
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Ile Thr Asp Gln Val Pro Phe Ser Val
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Lys Thr Trp Gly Gln Tyr Trp Gln Val
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Thr Ile Thr Asp Gln Val Pro Phe Ser Val
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Tyr Leu Asn Lys Ile Gln Asn Ser Leu
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Lys Ala Gly Glu Phe Tyr Asn Gln Met Met
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Asn Ile Ala Glu Gly Leu Arg Ala Leu
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Ala Leu Ala Ile Pro Gln Cys Arg Leu
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Val Leu Lys Asp Ala Ile Lys Asp Leu
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His Leu Ile Val Asp Thr Asp Ser Leu
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Pro Leu Ala Ser Ala Met Arg Met Leu
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Arg Met Leu Trp Met Ala Asn Tyr Ile
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Pro Met Pro Leu Pro Pro Ser Gln Leu
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Glu Ile Lys Arg Tyr Lys Asn Arg Val
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Leu Leu Lys Gln Met Cys Pro Ser Leu
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Gln Leu Arg Arg His Ile Asp Leu Leu Val
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Asp Leu Cys Gly Ser Val Phe Leu Val
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Phe Leu Leu Ala Asp Ala Arg Val
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Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val
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Leu Leu Ala Pro Gly Ala Lys Gln Asn Val
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Phe Leu Leu Ser Leu Gly Ile His Leu
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Ser Leu Tyr Ala Asp Ser Pro Ser Val
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Gly Leu Ser Arg Tyr Val Ala Arg Leu
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Lys Ile Phe Gly Ser Leu Ala Phe Leu
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Glu Leu Val Ser Glu Phe Ser Arg Met
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Lys Leu Thr Pro Leu Cys Val Thr Leu
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Val Leu Tyr Arg Tyr Gly Ser Phe Ser Val
1 5 10
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Tyr Ile Gly Glu Val Leu Val Ser Val
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Leu Leu Phe Asn Ile Leu Gly Gly Trp Val
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Leu Leu Val Pro Phe Val Gln Trp Phe Trp
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Ala Leu Met Pro Leu Tyr Ala Cys Ile
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Tyr Leu Val Ala Tyr Gln Ala Thr Val
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Thr Leu Gly Ile Val Cys Pro Ile Cys
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Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu
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Leu Leu Pro Ile Phe Phe Cys Leu Trp Val
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Tyr Met Asp Asp Val Val Leu Gly Ala
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Gly Thr Leu Gly Ile Val Cys Pro Ile
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Cys Ile Asn Gly Val Cys Trp Thr Val
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Ile Leu Thr Val Ile Leu Gly Val Leu
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Ile Leu Asp Ser Phe Asp Pro Leu Val
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Leu Leu Cys Leu Ile Phe Leu Leu
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Leu Ile Asp Tyr Gln Gly Met Leu Pro Val
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Ser Ile Val Ser Pro Phe Ile Pro Leu Leu
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Phe Leu Leu Thr Arg Ile Leu Thr Ile
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His Leu Gly Asn Val Lys Tyr Leu Val
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Gly Ile Ala Gly Gly Leu Ala Leu Leu
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Ile Leu Ala Gly Tyr Gly Ala Gly Val
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Gly Leu Gln Asp Cys Thr Met Leu Val
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Val Ile Tyr Gln Tyr Met Asp Asp Leu Val
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Val Leu Pro Asp Val Phe Ile Arg Cys
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Ala Val Gly Ile Gly Ile Ala Val Val
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Leu Val Val Leu Gly Leu Leu Ala Val
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Ala Leu Gly Leu Gly Leu Pro Val
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Gly Ile Gly Ile Gly Val Leu Ala Ala
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Gly Ala Gly Ile Gly Val Ala Val Leu
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Ile Ala Gly Ile Gly Ile Leu Ala Ile
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Leu Ile Val Ile Gly Ile Leu Ile Leu
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Leu Ala Gly Ile Gly Leu Ile Ala Ala
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Val Asp Gly Ile Gly Ile Leu Thr Ile
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Gly Ala Gly Ile Gly Val Leu Thr Ala
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Ala Ala Gly Ile Gly Ile Ile Gln Ile
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<213> Escherichia Coli
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Gln Ala Gly Ile Gly Ile Leu Leu Ala
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Ile Ile Val Leu Ala Ile Ile Ala Ile
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Thr Leu Val Glu Val Thr Leu Gly Glu Val
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Val Tyr Gly Val Ile Gln Lys
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<211> 12
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<213> Artificial Sequence
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<211> 15
<212> PRT
<213> Artificial Sequence
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Arg Pro Gln Ala Ser Gly Val Tyr Met Gly Asn Leu Thr Thr Gln
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<212> PRT
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<220>
<223> Epitope mimic of natural tumor Ag

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Lys Ala Val Tyr Asn Phe Ala Thr Cys
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<400> 979
Glu Val Asp Pro Ala Ser Asn Thr Tyr
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